

**CSC 261/461: Homework 1**

**Date posted: 09/15, Due date: 09/23 time 11:59PM**

**Total Points: 6**

1. (2 points) Suppose each of the following Update operations is applied directly to the database of the figure below. Discuss all integrity constraints violated by each operation, if any, and the different ways of enforcing these constraints:

(a) Insert < 'Robert', 'F', 'Scott', '943775543', '21-JUN-42', '2365 Newcastle Rd, Bellaire, TX', M, 58000, '888665555', 1 > into EMPLOYEE.

(b) Insert < 'ProductA', 4, 'Bellaire', 2 > into PROJECT.

(c) Insert < 'Production', 4, '943775543', '01-OCT-88' > into DEPARTMENT.

(d) Insert < '677678989', null, '40.0' > into WORKS\_ON.

(e) Insert < '453453453', 'John', M, '12-DEC-60', 'SPOUSE' > into DEPENDENT.

(f) Delete the WORKS\_ON tuples with ESSN= '333445555'.

(g) Delete the EMPLOYEE tuple with SSN= '987654321'.

(h) Delete the PROJECT tuple with PNAME= 'ProductX'.

(i) Modify the MGRSSN and MGRSTARTDATE of the DEPARTMENT tuple with DNUMBER=5 to '123456789' and '01-OCT-88', respectively.

(j) Modify the SUPERSSN attribute of the EMPLOYEE tuple with SSN= '999887777' to '943775543'.

(k) Modify the HOURS attribute of the WORKS\_ON tuple with ESSN= '999887777' and PNO= 10 to '5.0'.

**Figure for problem 1:**

**EMPLOYEE**

Fname	Minit	Lname	<u>Ssn</u>	Bdate	Address	Sex	Salary	Super_ssn	Dno
John	B	Smith	123456789	1965-01-09	731 Fondren, Houston, TX	M	30000	333445555	5
Franklin	T	Wong	333445555	1955-12-08	638 Voss, Houston, TX	M	40000	888665555	5
Alicia	J	Zelaya	999887777	1968-01-19	3321 Castle, Spring, TX	F	25000	987654321	4
Jennifer	S	Wallace	987654321	1941-06-20	291 Berry, Bellaire, TX	F	43000	888665555	4
Ramesh	K	Narayan	666884444	1962-09-15	975 Fire Oak, Humble, TX	M	38000	333445555	5
Joyce	A	English	453453453	1972-07-31	5631 Rice, Houston, TX	F	25000	333445555	5
Ahmad	V	Jabbar	987987987	1969-03-29	980 Dallas, Houston, TX	M	25000	987654321	4
James	E	Borg	888665555	1937-11-10	450 Stone, Houston, TX	M	55000	NULL	1

**DEPARTMENT**

Dname	<u>Dnumber</u>	Mgr_ssn	Mgr_start_date
Research	5	333445555	1988-05-22
Administration	4	987654321	1995-01-01
Headquarters	1	888665555	1981-06-19

**DEPT\_LOCATIONS**

<u>Dnumber</u>	<u>Dlocation</u>
1	Houston
4	Stafford
5	Bellaire
5	Sugarland
5	Houston

**WORKS\_ON**

<u>Essn</u>	<u>Pno</u>	Hours
123456789	1	32.5
123456789	2	7.5
666884444	3	40.0
453453453	1	20.0
453453453	2	20.0
333445555	2	10.0
333445555	3	10.0
333445555	10	10.0
333445555	20	10.0
999887777	30	30.0
999887777	10	10.0
987987987	10	35.0
987987987	30	5.0
987654321	30	20.0
987654321	20	15.0
888665555	20	NULL

**PROJECT**

Pname	<u>Pnumber</u>	Plocation	Dnum
ProductX	1	Bellaire	5
ProductY	2	Sugarland	5
ProductZ	3	Houston	5
Computerization	10	Stafford	4
Reorganization	20	Houston	1
Newbenefits	30	Stafford	4

**DEPENDENT**

<u>Essn</u>	<u>Dependent_name</u>	Sex	Bdate	Relationship
333445555	Alice	F	1986-04-05	Daughter
333445555	Theodore	M	1983-10-25	Son
333445555	Joy	F	1958-05-03	Spouse
987654321	Abner	M	1942-02-28	Spouse
123456789	Michael	M	1988-01-04	Son
123456789	Alice	F	1988-12-30	Daughter
123456789	Elizabeth	F	1967-05-05	Spouse

2. (2 points) Consider the AIRLINE relational database schema shown in the figure below, which describes a database for airline flight information. Each FLIGHT is identified by a flight NUMBER, and consists of one or more FLIGHT\_LEGS with LEG\_NUMBERS 1, 2, 3, etc. Each leg has scheduled

arrival and departure times and airports, and has many LEG\_INSTANCES--one for each DATE on which the flight travels. FARES are kept for each flight. For each leg instance, SEAT\_RESERVATIONS are kept, as is the AIRPLANE used in the leg, and the actual arrival and departure times and airports. An AIRPLANE is identified by an AIRPLANE\_ID, and is of a particular AIRPLANE\_TYPE. CAN\_LAND relates AIRPLANE\_TYPES to the AIRPORTs in which they can land. An AIRPORT is identified by an AIRPORT\_CODE. Consider an update for the AIRLINE database to enter a reservation on a particular flight or flight leg on a given date.

- (a) Give the operations for this update.
- (b) What types of constraints would you expect to check?
- (c) Which of these constraints are key, entity integrity, and referential integrity constraints and which are not?
- (d) Specify all the referential integrity constraints on the figure.

**Figure for problem 2:**

**AIRPORT**

<u>Airport_code</u>	Name	City	State
---------------------	------	------	-------

**FLIGHT**

<u>Flight_number</u>	Airline	Weekdays
----------------------	---------	----------

**FLIGHT\_LEG**

<u>Flight_number</u>	<u>Leg_number</u>	Departure_airport_code	Scheduled_departure_time
		Arrival_airport_code	Scheduled_arrival_time

**LEG\_INSTANCE**

<u>Flight_number</u>	<u>Leg_number</u>	<u>Date</u>	Number_of_available_seats	Airplane_id	
		Departure_airport_code	Departure_time	Arrival_airport_code	Arrival_time

**FARE**

<u>Flight_number</u>	<u>Fare_code</u>	Amount	Restrictions
----------------------	------------------	--------	--------------

**AIRPLANE\_TYPE**

<u>Airplane_type_name</u>	Max_seats	Company
---------------------------	-----------	---------

**CAN\_LAND**

<u>Airplane_type_name</u>	<u>Airport_code</u>
---------------------------	---------------------

**AIRPLANE**

<u>Airplane_id</u>	Total_number_of_seats	Airplane_type
--------------------	-----------------------	---------------

**SEAT\_RESERVATION**

<u>Flight_number</u>	<u>Leg_number</u>	<u>Date</u>	<u>Seat_number</u>	Customer_name	Customer_phone
----------------------	-------------------	-------------	--------------------	---------------	----------------

3. (2 points) Consider the relation CLASS(Course#, Univ\_Section#, InstructorName, Semester, BuildingCode, Room#, TimePeriod, Weekdays, CreditHours). This represents classes taught in a university with unique Univ\_Section#. Give what you think should be various candidate keys and write in your own words under what constraints each candidate key would be valid.

**Note:** You get 0 points if you get the question wrong or you don't submit, 1 point if you get the question right, show that you understand the concepts and make a considerable effort to solve it without having a complete solution. You get 2 points for each problem if you provide a solution that correctly addresses the requirements and is complete.